

ABSTRACT

Ultrafast solid state amplifiers of electrical current, including power amplification devices, use injection of spin-polarized electrons from a magnetic region into another magnetic region through a semiconductor control region and electron spin precession inside the control region induced by magnetic field resulting from a current flowing through a conductive nanowire. The amplifiers may include magnet-semiconductor-magnet heterostructures and are able to operate on electric currents and electromagnetic waves having frequencies up to 100 GHz or more.